Questioned Documents Unit (QDU)
Procedures for Conducting Paper Fiber Impression Transfer and Fracture Pattern Examinations

1 Scope

These procedures will be used by a forensic document examiner to conduct examinations of documents containing typewritten impressions or corrections with most carbon and correction film ribbons.

2 Equipment/Materials/Reagents

- Fostec 150 watt tungsten halogen light, or comparable equipment
- Laboratory Supplies Co., Inc. 30 watt transmitted light box, or comparable equipment
- Hand magnifier (minimum magnification, 4X)
- Leica stereomicroscope (minimum magnification, 6.3X), or comparable equipment
- Leica DMC Comparison Microscope (minimum magnification, 32X), or comparable equipment
- Keyence VHX-2000E Digital Microscope, or comparable equipment
- Ribbon Analysis Workstation 3.9.2 (RAW II), or comparable equipment
- Foster and Freeman Video Spectral Comparator (VSC), or comparable equipment
- ChemImage Hyperspectral Imager (HSI) Examiner 200 QD, or comparable equipment

3 Standards and Controls

Not Applicable.

4 Sampling

Not Applicable.

5 Procedures

5.1 Visually examine the questioned typewritten text using lighting and magnification sufficient to allow fine detail to be distinguished to determine the type of ribbon used (Table 1).

If a carbon ribbon or correction ribbon was used, then analyze the typewritten document using the *QDU Procedures for Conducting Typewriting Examinations.* If fabric or multi-strike carbon ribbons were used, discontinue paper fiber examinations.

Table 1: Characteristics of Various Types of Ribbon

Type of Ribbon	Characteristics of Ribbon
Fabric	• Warp and weave pattern of fabric • Ink soaks into paper • Uneven inking of letter • No flaking
Carbon yellow or orange (Single-strike)	• Plastic film ribbon • Carbon-wax coating on ribbon • No ink absorbing into paper • Clean outline of letter • May be flaking of carbon • May be lift off or cover up corrections
Carbon Pink (Permanent)	• Plastic film ribbon • Carbon, wax, dye coating on ribbon • Permanent • No correction
Carbon Blue (Multi-strike)	• Plastic film ribbon • Liquid ink • Multi-strike or security • Looks like a combination of fabric ribbon and carbon
Carbon Green (Composer)	• Used by type-setters • Wider and bigger ribbon
Thermal	• Heated wax carbon ribbon • Adheres to surface of paper

5.2 Examine the ribbon to be compared using back lighting, if necessary, to determine if it is consistent with the type of ribbon and style of type used to prepare the questioned text. If the ribbon is not consistent with the questioned typewriting, Redacted discontinue the examinations.

5.3 Refer to the *QDU Procedures for Conducting Office Equipment Ribbon Examinations* to determine whether the questioned typewritten text is present on the ribbon. If the questioned text is not present, discontinue the examination.

5.4 Compare the wording, type style, size, and any corrections for consistency between the comparable text on the ribbon and the questioned typewritten text. If typewritten text and ribbon text are consistent, then proceed with paper fiber and/or fracture pattern comparisons. If

the same wording appears multiple times on the same ribbon, evaluate each repetition independently, as necessary. If the text is not consistent, discontinue examination and make appropriate notations in the examination records.

5.5 Using a comparison microscope, VSC (for performance and verification frequency, refer to the VSC Performance and Maintenance logbook nearest the instruments), or similar equipment, compare similar portions of the typewritten text and ribbon text.

5.5.1 Characteristics to evaluate during a comparison Redacted

If consistent, the examiner will draw, photograph, or by any other means document the correspondence between the paper fibers and/or fracture patterns and the typewritten text. If not consistent, make the appropriate notations in the examination records.

5.5.2 Examine like characters from several areas of the text and ribbon (e.g., the beginning, middle, and end) for correspondence between the typewritten text and the corresponding portions of the ribbon.

5.6 Make notations in the examination records that, at a minimum, include any printouts, photographs, digital images, or drawings of any identifying and/or eliminating characteristics and/or fracture patterns used to support your findings or conclusions.

5.7 Conclusions

- **Identification** - The examiner's opinion that the questioned typewritten text was prepared by the known typewriter ribbon due to agreement in all identifying characteristics. No differences that would preclude an identification were observed.

- **No Conclusion/No Determination** - No determination can be reached whether the typewritten text originated/did not originate from a known ribbon. Although there may be correspondence in class characteristics between the items, factors are present that significantly limit meaningful examinations. This opinion requires explanation of limiting factors.

- **Elimination** - The examiner's opinion that the questioned typewritten text was not prepared by the known typewriter ribbon due to sufficient disagreement in class and/or identifying characteristics.

6 Calculations

Not Applicable.

7 Measurement Uncertainty

Not Applicable.

8 Limitations

The following factors could affect the examination process and/or the results rendered:
Redacted

- Insufficient quantity of original material submitted for examination.
- Prior destructive forensic examinations such as some latent print processing.
- Ribbons that are not suitable Redacted

- Lack of sufficient identifying characteristics.

9 Safety

Standard precautions should be followed for the handling of chemical and biological materials. Examiners/analysts may refer to the *FBI Laboratory Safety Manual* for additional guidance. Chemical and biological materials that are hazardous or potentially hazardous will be maintained and examined in specifically designated areas within the QDU space.

10 References

FBI Laboratory Safety Manual

Gerhart, F. James, "Examinations of Paper Fiber Impressions on Carbon Paper, A Method of Positive Identification." (320)

Gerhart, F. James, "Methods of Associating Typewriter Ribbons and Correcting Tapes with a Questioned Text," American Society of Questioned Document Examiners, September 1988. (234)

Hahn, G. H., "Paper Fiber Impressions on Carbon Tape Ribbons," *Journal of Forensic Sciences*, December 1972. (635)

Rev. #	Issue Date	History
3	03/03/15	Updated Header to read "QDU Standard Operating Procedures Manual". Added "Impression" to title. Section 2 changed "equivalent" to "comparable equipment" and "instrumentation" to "equipment". Added sixth bullet and last bullet. Deleted Section 4 "Calibration" and renumbered accordingly. Renumbered Section 5. Section 5.1 Table 1 reformatted bullets. Section 5.7 for the conclusions "Identification" and "Elimination" replaced "A determination" with "The examiner's opinion". Section 7 changed "Uncertainty of Measurement" to "Measurement Uncertainty". Section 8 hyphenated "Nonoriginal". Reformatted bullets and made grammatical changes throughout document where necessary.
4	03/01/18	2 Equipment/Materials/Reagents, seventh bullet, added "II" to RAW, ninth bullet, changed 100 to "200" HSI.5.1 added "were used" for multi-strike carbon ribbons. 5.5 added, "(for performance and verification frequency, refer to the VSC Performance and Maintenance logbook nearest the instruments."

Redacted - Signatures on File

Approval

Questioned Documents Unit Chief — Date: 02/28/2018

Questioned Documents Technical Leader — Date: 02/28/2018

QA Approval

Quality Manager — Date: 02/28/2018